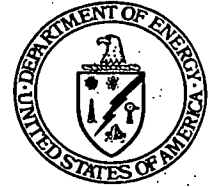




## Department of Energy

Ohio Field Office  
Fernald Area Office

P. O. Box 538705  
Cincinnati, Ohio 45253-8705  
(513) 648-3155



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APR 26 2000

Mr. James A. Saric, Remedial Project Manager  
U.S. Environmental Protection Agency  
Region V, SRF-5J  
77 West Jackson Boulevard  
Chicago, Illinois 60604-3590

DOE-0626-00

Mr. Tom Schneider, Project Manager  
Ohio Environmental Protection Agency  
401 East 5th Street  
Dayton, Ohio 45402-2911

Ms. Val Orr  
Ohio Environmental Protection Agency  
Division of Drinking and Ground Waters - UIC Unit  
P.O. Box 1049  
1800 Watermark Drive  
Columbus, Ohio 43216-1049

Dear Mr. Saric, Mr. Schneider, and Ms. Orr:

### NOVEMBER 1999 OPERATING REPORT FOR THE RE-INJECTION DEMONSTRATION

This correspondence submits the Re-Injection Demonstration Operation Report for the month of November 1999.

As specified in the Re-Injection Demonstration Test Plan, monthly operating reports for the re-injection demonstration are to be prepared and submitted to the U.S. Environmental Protection Agency (U.S. EPA), Ohio Environmental Protection Agency (OEPA) Office of Federal Facilities Oversight, and the OEPA Division of Drinking and Ground Waters-UIC Unit.

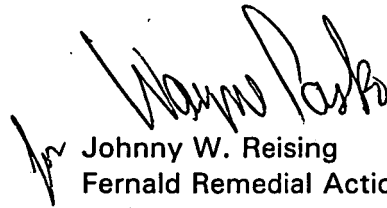
Mr. James A. Saric  
Mr. Tom Schneider  
Ms. Val Orr

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APR 26 2000

If you have any questions regarding this submittal, please contact Robert Janke at (513) 648-3124.

Sincerely,

  
Johnny W. Reising  
Fernald Remedial Action  
Project Manager

FEMP:R.J. Janke

Enclosure

cc w/enclosure:

R. J. Janke, OH/FEMP  
G. Jablonowski, USEPA-V, SRF-5J  
M. R. Rochotte, OEPA-Columbus  
T. Schneider, OEPA-Dayton (three copies of enclosure)  
F. Bell, ATSDR  
F. Hodge, Tetra Tech  
M. Schupe, HSI GeoTrans  
R. Vandegrift, ODH  
D. Brettschneider, Fluor Fernald/52-5  
K. Broberg, Fluor Fernald/52-5  
W. Hertel, Fluor Fernald/52-5  
M. Jewett, Fluor Fernald/52-2  
R. White, Fluor Fernald/52-5  
AR Coordinator, Fluor Fernald/78

cc w/o enclosure:

N. Hallein, EM-31/CLOV  
J. Reising, OH/FEMP  
A. Tanner, OH/FEMP  
D. Carr, Fluor Fernald/2  
T. Hagen, Fluor Fernald/65-2  
J. Harmon, Fluor Fernald/90  
S. Hinnefeld, Fluor Fernald/31  
U. Kumthekar, Fluor Fernald/64  
T. Walsh, Fluor Fernald/65-2  
ECDC, Fluor Fernald/52-7

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**MONTHLY OPERATING REPORT  
RE-INJECTION DEMONSTRATION  
NOVEMBER 1999**

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**OVERVIEW**

On September 2, 1999, DOE completed one year of active groundwater re-injection as part of a one-year groundwater re-injection demonstration. DOE is currently in the process of preparing a final report.

Although the data are still being analyzed, operational experience gained over the last year indicates that DOE can effectively operate the re-injection wells. A cursory review of the data collected from the aquifer over the past year indicates that groundwater re-injection has not had any adverse effects on the aquifer. DOE is therefore continuing with the use of re-injection pending the issuance of the final report on June 30, 2000. DOE will continue producing monthly re-injection operating reports during this interim time period.

These monthly reports will be submitted to the U.S. EPA, Ohio EPA Office of Federal Facilities Oversight and the Division of Ohio EPA Drinking and Ground Waters - UIC Unit, and will include the following information:

- I. Analysis of the injectate
- II. The volume and rate of re-injection
- III. A description of any well maintenance and rehabilitation procedures which were conducted
- IV. Results of groundwater monitoring at the re-injection test site, conducted above and beyond the IEMP.

This report covers re-injection operations from November 1, 1999 through December 1, 1999.

**ANALYSIS OF THE INJECTATE**

Groundwater which is being extracted from the great Miami Aquifer is being treated for uranium removal and re-injected back into the Great Miami Aquifer. The groundwater is being treated in the FEMP Advanced Waste Water Treatment (AWWT) Expansion Facility. The effluent from the AWWT Expansion Facility is being sampled monthly for the parameters listed in Table 2.1 of the Re-Injection Demonstration Test Plan, Rev. 0. Monthly injectate grab sampling is focusing on the final remediation

level (FRL) constituents that have had an exceedance of their FRL in the area of the aquifer from which the groundwater is being pumped. The monthly injectate grab samples are being sent to an off-site laboratory for analysis.

Results from the monthly injectate grab sample collected in November are provided in Table 1. These results indicate that all the constituent concentrations are below their respective FRLs.

Figure 1 shows the composite daily uranium results from the AWWT Expansion Facility effluent. These results are derived from the 24-hour composite sampler, which samples the combined effluent from the active treatment trains comprising the facility. The results are used by plant management as process control; they provide a daily evaluation of the quality of the water that is being re-injected back into the Aquifer. These data indicate that the uranium concentration of the treated groundwater re-injected back into the aquifer in November, was below  $20\mu\text{g/L}$ .

#### VOLUME AND RATE OF RE-INJECTION

Treated groundwater is being re-injected into the Great Miami Aquifer in five re-injection wells at a rate of 200 gallons per minute, per well. Figure 2 illustrates the location of the five re-injection wells. Re-Injection Well 8 is 8 inches in diameter. Re-Injection Well 9 is 12 inches in diameter. The other re-injection wells are all 16 inches in diameter. The combined design re-injection rate for all five wells is 1000 gallons per minute. Operational data specific to each re-injection well are provided in Tables 2 through 6.

Figure 3 illustrates the water level rise in each of the five re-injection wells from November 1, 1999 through December 1, 1999, as measured by the operators at the AWWT Expansion Facility Distributed Control System (DCS). Water levels are recorded three times per day. Water levels inside the re-injection wells are monitored as an indicator of plugging within the wells. Given a constant re-injection rate, as a well screen becomes plugged, the water level in the well rises to compensate for the greater pressure needed to move the same volume of water through a smaller opening.

While it is not the intent of this report to discuss operational efficiency issues, the following information is provided to aid in the interpretation of Figure 3. From November 12, 1999 to November 13, 1999 (readings 1311 to 1314) the re-injection wells were not operating to facilitate the re-start of the treatment

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system after regeneration. From November 16, 1999 to November 21, 1999 (readings 1324 to 1337), and from November 30, 1999 to the end of the month (readings 1364 to 1376) the re-injection wells were not operating to facilitate construction tie-ins for two new extraction wells in the South Field Area.

#### WELL MAINTENANCE AND REHABILITATION

No well maintenance to address plugging was performed in November.

#### GROUNDWATER MONITORING RESULTS

As explained in the overview section of this report the one-year groundwater Re-Injection Demonstration officially ended on September 2, 1999. No water quality sampling, other than IEMP sampling, is planned at this time. Results from the demonstration will be presented in a final report, to be issued in June of 2000. The final report will make recommendations concerning additional monitoring if it is determined that additional monitoring is warranted.

TABLE 1

**ANALYSIS OF INJECTATE**  
**Sample Collected November 29, 1999**

| Constituents <sup>a</sup>  | Result <sup>b</sup> | Groundwater FRL <sup>c</sup> | Detection Limit | Constituent Type <sup>e</sup> | Basis for FRL <sup>f</sup> |
|----------------------------|---------------------|------------------------------|-----------------|-------------------------------|----------------------------|
| <b>General Chemistry</b>   |                     | mg/L                         |                 |                               |                            |
| Nitrate                    | 0.560               | 11.0                         |                 | MP                            | B                          |
| <b>Inorganics</b>          |                     | mg/L                         |                 |                               |                            |
| Antimony                   | 0.00074             | 0.006                        |                 | N                             | A                          |
| Arsenic                    | 0.001               | 0.05                         |                 | N                             | A                          |
| Barium                     | 0.0499              | 2.0                          |                 | N                             | A                          |
| Beryllium                  | 0.00002             | 0.004                        |                 | N                             | A                          |
| Cadmium                    | 0.00010             | 0.014                        |                 | N                             | B                          |
| Total Chromium             | 0.00098             | 0.022 <sup>d</sup>           |                 | MP                            | R                          |
| Cobalt                     | 0.00018             | 0.17                         |                 | N                             | R                          |
| Lead                       | 0.00096             | 0.015                        |                 | N                             | A                          |
| Manganese                  | 0.0011              | 0.9                          |                 | N                             | B                          |
| Mercury                    | 0.0001              | 0.002                        |                 | MP                            | A                          |
| Nickel                     | 0.00045             | 0.1                          |                 | N                             | A                          |
| Selenium                   | 0.001               | 0.05                         |                 | N                             | A                          |
| Silver                     | 0.0002              | 0.05                         |                 | N                             | R                          |
| Vanadium                   | 0.00015             | 0.038                        |                 | N                             | R                          |
| Zinc                       | 0.0027              | 0.021                        |                 | N                             | B                          |
| <b>Radionuclides</b>       |                     | pCi/L                        |                 |                               |                            |
| Neptunium-237              | U                   | 1.0                          | 0.00879         | MP                            | R*                         |
| Radium-226                 | 1.03                | 20.0                         |                 | N                             | A                          |
| Strontium-90               | U                   | 8.0                          | 0.283           | MP                            | A                          |
| Thorium-228                | U                   | 4.0                          | 0.0162          | N                             | R*                         |
| Thorium-232                | U                   | 1.2                          | 0.00203         | N                             | R*                         |
| <b>Total Uranium</b>       | 1.04                | 20.0                         |                 | MP                            | A                          |
| <b>Organics</b>            |                     | µg/L                         |                 |                               |                            |
| Bis(2-ethylhexyl)phthalate | U                   | 6.0                          | 5               | N                             | A                          |
| Carbon disulfide           | U                   | 5.5                          | 1               | N                             | A                          |
| 1, 1-Dichloroethene        | U                   | 7.0                          | 1               | N                             | A                          |
| 1, 2-Dichloroethane        | U                   | 5.0                          | 1               | MP                            | A                          |
| Trichloroethene            | U                   | 5.0                          | 1               | N                             | A                          |

<sup>a</sup>Constituents taken from Table 2-1 of Re-Injection Demonstration Test Plan. Constituents are those previously detected in aquifer zones 2 and 4 at concentrations above their FRL.

<sup>b</sup>If a duplicate sample was analyzed the highest concentration between the regular sample and duplicate sample is reported.  
 U = Nondetect

<sup>c</sup>From Table 9-4 in OUS ROD.

<sup>d</sup>FRL is for hexavalent chromium.

<sup>e</sup>Constituent types from Appendix A of IEMP. MP indicates that the constituent has been identified as being able to migrate to the aquifer. N indicates that the constituent has been identified as not being able to migrate to the aquifer.

<sup>f</sup>A - Applicable or relevant and appropriate requirement based (MCL, PMCL, etc.).

B - Based on 95<sup>th</sup> percentile background concentrations.

R - Risk-based

R\* - Risk-based radionuclide cleanup levels include constituent specific 95<sup>th</sup> percentile background concentration.

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TABLE 2

**RE-INJECTION WELL 22107 (IW-8)  
OPERATIONAL SUMMARY SHEET  
NOVEMBER 1999**

Reference Elevation (feet AMSL) - 539.92 (top of casing)

Northing Coordinate ('83) - 476196.22

Easting Coordinate ('83) - 1347978.25

Hours in reporting period<sup>a</sup> = 711.73

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 156.80Hours injecting<sup>c</sup> = 554.93Operational percent<sup>d</sup> = 78

| Monthly Measurements |                                       |   |
|----------------------|---------------------------------------|---|
| Month                | Million Gallons Injected <sup>e</sup> | Average Operating Injection Rate (gpm) <sup>f</sup> |
| 9/98                 | 8.16                                  | 206   |
| 10/98                | 5.78                                  | 203   |
| 11/98                | 8.47                                  | 196   |
| 12/98                | 5.76                                  | 222   |
| 1/99                 | 5.35                                  | 227   |
| 2/99                 | 7.06                                  | 196   |
| 3/99                 | 7.34                                  | 205   |
| 4/99                 | 7.75                                  | 197   |
| 5/99                 | 7.46                                  | 216   |
| 6/99                 | 8.42                                  | 197   |
| 7/99                 | 8.93                                  | 201   |
| 8/99                 | 8.64                                  | 199   |
| 9/99                 | 3.92                                  | 181   |
| 10/99                | 7.86                                  | 199   |
| 11/99                | 6.67                                  | 200   |

<sup>a</sup>First operational shift reading on 11/1/99 to first operational shift reading on 12/1/99<sup>b</sup>Downtime. All injection wells were not operating 11/12/99 to 11/13/99 to facilitate the startup of the treatment system following resin regeneration. 11/16/99 to 11/21/99 and 11/30/99 through the end of the month to facilitate construction activities in the South Field.<sup>c</sup>Hours in reporting period - Hours not injecting<sup>d</sup>(Hours injecting/Hours in reporting period) x 100<sup>e</sup>Summation of daily totalizer differences<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

TABLE 3

**RE-INJECTION WELL 22108 (IW-9)  
OPERATIONAL SUMMARY SHEET  
NOVEMBER 1999**

Reference Elevation (feet AMSL) - 578.025 (top of casing)

Northing Coordinate ('83) - 476255.74

Easting Coordinate ('83) - 1348384.49

Hours in reporting period<sup>a</sup> = 712.73

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 124.00Hours injecting<sup>c</sup> = 588.73Operational percent<sup>d</sup> = 82.6

| Monthly Measurements |                                       |   |
|----------------------|---------------------------------------|---|
| Month                | Million Gallons Injected <sup>e</sup> | Average Operating Injection Rate (gpm) <sup>f</sup> |
| 9/98                 | 8.17                                  | 206   |
| 10/98                | 8.30                                  | 201   |
| 11/98                | 8.53                                  | 197   |
| 12/98                | 5.66                                  | 214   |
| 1/99                 | 4.33                                  | 181   |
| 2/99                 | 6.07                                  | 156 <sup>g</sup>                                    |
| 3/99                 | 5.93                                  | 178 <sup>h</sup>                                    |
| 4/99                 | 6.66                                  | 184   |
| 5/99                 | 7.83                                  | 200   |
| 6/99                 | 8.41                                  | 197   |
| 7/99                 | 8.79                                  | 198   |
| 8/99                 | 8.63                                  | 198   |
| 9/99                 | 5.68                                  | 187   |
| 10/99                | 7.80                                  | 198   |
| 11/99                | 6.54                                  | 185   |

<sup>a</sup>First operational shift reading on 11/1/99 to first operational shift reading on 12/1/99<sup>b</sup>Downtime. All injection wells were not operating 11/12/99 to 11/13/99 to facilitate the startup of the treatment system following resin regeneration. 11/16/99 to 11/21/99 and 11/30/99 through the end of the month to facilitate construction activities in the South Field.<sup>c</sup>Hours in reporting period - Hours not injecting<sup>d</sup>(Hours injecting/Hours in reporting period) x 100<sup>e</sup>Summation of daily totalizer differences<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)<sup>g</sup>Injection out of smaller downcomer in February. Target Injection rate of smaller downcomer is 150 gpm.<sup>h</sup>Injection out of smaller downcomer up until March 8. Large downcomer was used from March 11 to April 1, 1999.



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TABLE 4

**RE-INJECTION WELL 22109 (IW-10)  
OPERATIONAL SUMMARY SHEET  
NOVEMBER 1999**

Reference Elevation (feet AMSL) - 576.92 (top of casing)

Northing Coordinate ('83) - 476175.65

Easting Coordinate ('83) - 1348860.53

Hours in reporting period<sup>a</sup> = 712.88

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 124.00Hours injecting<sup>c</sup> = 588.88Operational percent<sup>d</sup> = 82.6

| Monthly Measurements |                                       |   |
|----------------------|---------------------------------------|---|
| Month                | Million Gallons Injected <sup>e</sup> | Average Operating Injection Rate (gpm) <sup>f</sup> |
| 9/98                 | 8.13                                  | 205   |
| 10/98                | 8.28                                  | 200   |
| 11/98                | 8.50                                  | 196   |
| 12/98                | 5.72                                  | 217   |
| 1/99                 | 5.48                                  | 229   |
| 2/99                 | 8.09                                  | 208   |
| 3/99                 | 8.13                                  | 204   |
| 4/99                 | 5.35                                  | 190   |
| 5/99                 | 8.25                                  | 197   |
| 6/99                 | 8.36                                  | 196   |
| 7/99                 | 8.81                                  | 199   |
| 8/99                 | 8.52                                  | 196   |
| 9/99                 | 1.97                                  | 169   |
| 10/99                | 7.79                                  | 198   |
| 11/99                | 6.47                                  | 183   |

<sup>a</sup>First operational shift reading on 11/1/99 to first operational shift reading on 12/1/99<sup>b</sup>Downtime. All injection wells were not operating 11/12/99 to 11/13/99 to facilitate the startup of the treatment system following resin regeneration. 11/16/99 to 11/21/99 and 11/30/99 through the end of the month to facilitate construction activities in the South Field.<sup>c</sup>Hours in reporting period - Hours not injecting<sup>d</sup>(Hours injecting/Hours in reporting period) x 100<sup>e</sup>Summation of daily totalizer differences<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

TABLE 5

**RE-INJECTION WELL 22240 (IW-11)  
OPERATIONAL SUMMARY SHEET  
NOVEMBER 1999**

Reference Elevation (feet AMSL) - 577.14 (top of casing)

Northing Coordinate ('83) - 476422.82

Easting Coordinate ('83) - 1349386.92

Hours in reporting period<sup>a</sup> = 713.42

Target Injection Rate = 200 gpm

Hours not injecting<sup>b</sup> = 124.00Hours injecting<sup>c</sup> = 589.42Operational percent<sup>d</sup> = 82.6

| Monthly Measurements |                                       |   |
|----------------------|---------------------------------------|---|
| Month                | Million Gallons Injected <sup>e</sup> | Average Operating Injection Rate (gpm) <sup>f</sup> |
| 9/98                 | 8.39                                  | 211   |
| 10/98                | 8.29                                  | 199   |
| 11/98                | 8.50                                  | 197   |
| 12/98                | 5.68                                  | 216   |
| 1/99                 | 5.53                                  | 230   |
| 2/99                 | 8.06                                  | 208   |
| 3/99                 | 8.04                                  | 204   |
| 4/99                 | 7.56                                  | 192   |
| 5/99                 | 8.34                                  | 199   |
| 6/99                 | 8.42                                  | 197   |
| 7/99                 | 8.85                                  | 199   |
| 8/99                 | 8.65                                  | 199   |
| 9/99                 | 5.64                                  | 186   |
| 10/99                | 7.91                                  | 200   |
| 11/99                | 6.67                                  | 189   |

<sup>a</sup>First operational shift reading on 11/1/99 to first operational shift reading on 12/1/99<sup>b</sup>Downtime. All injection wells were not operating 11/12/99 to 11/13/99 to facilitate the startup of the treatment system following resin regeneration. 11/16/99 to 11/21/99 and 11/30/99 through the end of the month to facilitate construction activities in the South Field.<sup>c</sup>Hours in reporting period - Hours not injecting<sup>d</sup>(Hours injecting/Hours in reporting period) x 100<sup>e</sup>Summation of daily totalizer differences<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

TABLE 6

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**RE-INJECTION WELL 22111 (IW-12)  
OPERATIONAL SUMMARY SHEET  
NOVEMBER 1999**

Reference Elevation (feet AMSL) - 583.01 (top of casing)

Northing Coordinate ('83) - 476518.64

Easting Coordinate ('83) - 1350105.39

Hours in reporting period<sup>a</sup> = 713.48

Target Injection Rate = 200 gpm

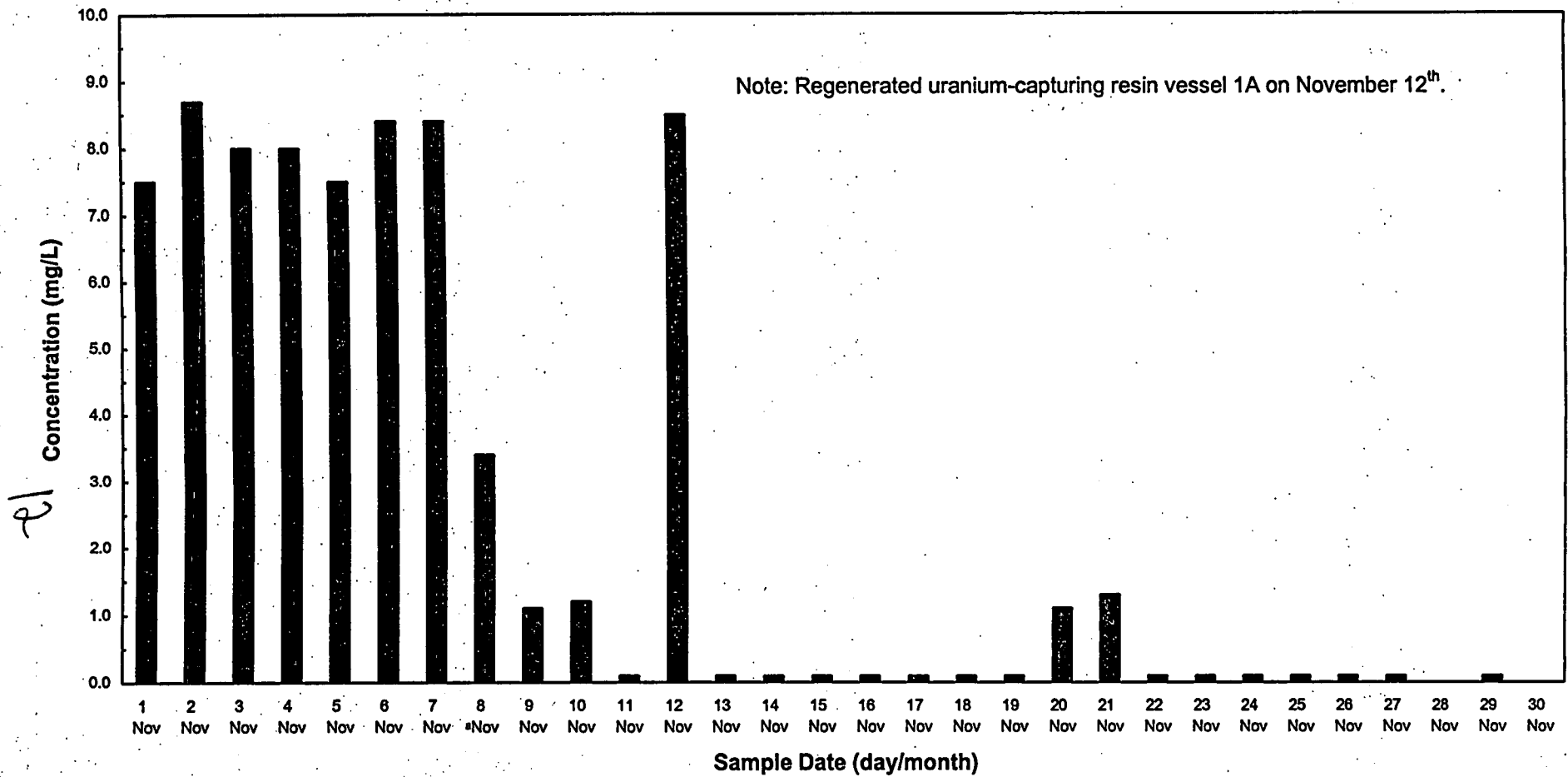
Hours not injecting<sup>b</sup> = 124.00Hours injecting<sup>c</sup> = 589.48Operational percent<sup>d</sup> = 82.6

| Monthly Measurements |                                       |   |
|----------------------|---------------------------------------|---|
| Month                | Million Gallons Injected <sup>e</sup> | Average Operating Injection Rate (gpm) <sup>f</sup> |
| 9/98                 | 8.12                                  | 205   |
| 10/98                | 8.27                                  | 201   |
| 11/98                | 8.53                                  | 197   |
| 12/98                | 5.61                                  | 219   |
| 1/99                 | 5.08                                  | 212   |
| 2/99                 | 8.06                                  | 208   |
| 3/99                 | 8.13                                  | 203   |
| 4/99                 | 7.65                                  | 195   |
| 5/99                 | 8.27                                  | 197   |
| 6/99                 | 8.42                                  | 197   |
| 7/99                 | 8.80                                  | 198   |
| 8/99                 | 8.67                                  | 199   |
| 9/99                 | 5.66                                  | 187   |
| 10/99                | 7.82                                  | 198   |
| 11/99                | 6.65                                  | 188   |

<sup>a</sup>First operational shift reading on 11/1/99 to first operational shift reading on 12/1/99<sup>b</sup>Downtime. All injection wells were not operating 11/12/99 to 11/13/99 to facilitate the startup of the treatment system following resin regeneration. 11/16/99 to 11/21/99 and 11/30/99 through the end of the month to facilitate construction activities in the South Field.<sup>c</sup>Hours in reporting period - Hours not injecting<sup>d</sup>(Hours injecting/Hours in reporting period) x 100<sup>e</sup>Summation of daily totalizer differences<sup>f</sup>Million Gallons Injected/(Hours Injecting x 60)

FIGURE 1

URANIUM CONCENTRATION OF AWWT EXPANSION EFFLUENT\*  
NOVEMBER 1999



\* Samples derived from combined plant effluent via 24-hour Composite Sampler.

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STATE PLANNED COORDINATE SYSTEM 1983

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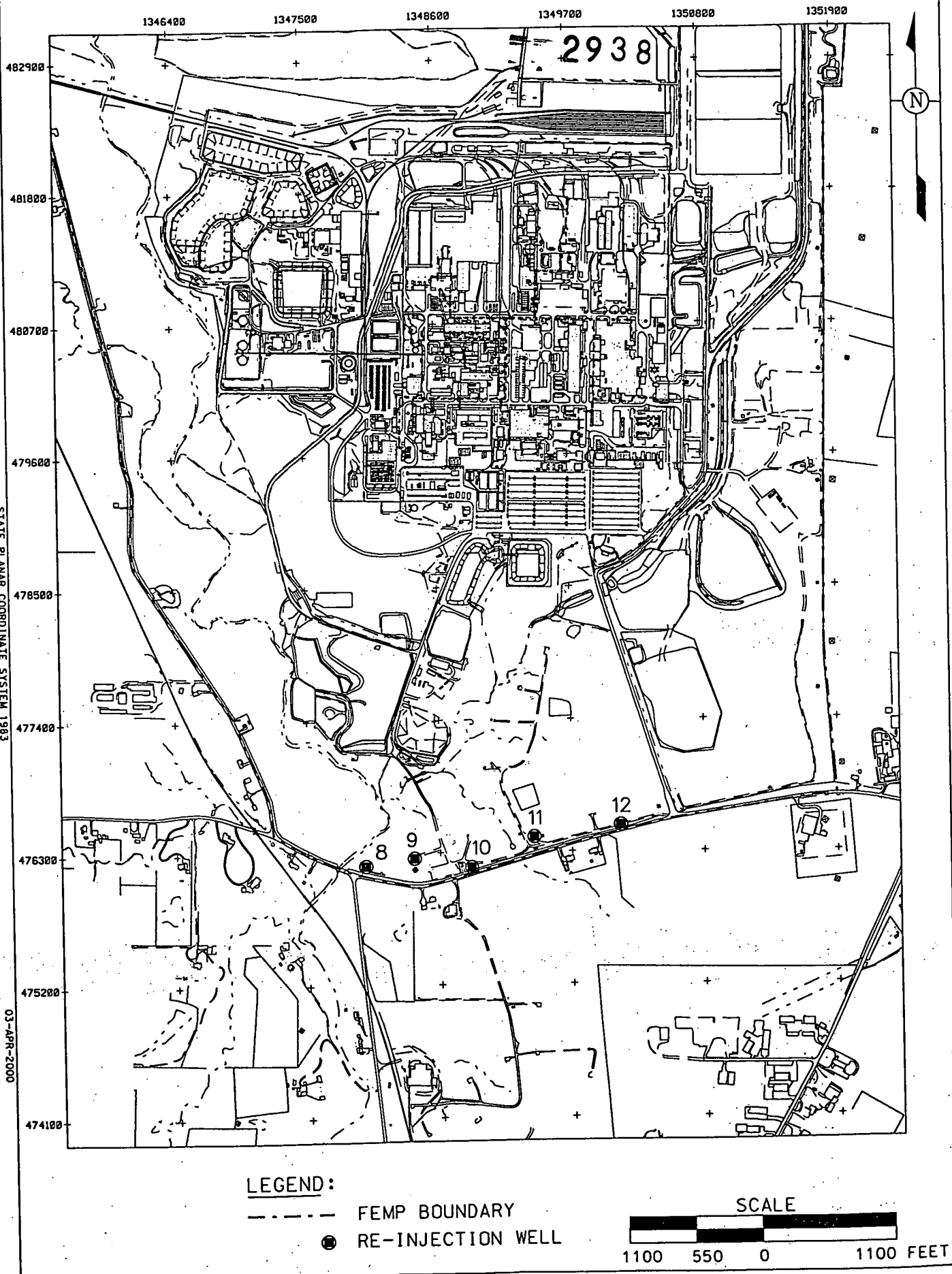


FIGURE 2. LOCATION OF RE-INJECTION WELLS

Figure 3.  
Re-Injection Wells, Water Level Rise  
November 1, 1999 to December 1, 1999

